

AMPLITUDES OF SEISMIC WAVES GENERATED BY EXPLOSIONS IN DRILL HOLES IN MIZUHO PLATEAU, EAST ANTARCTICA

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Abstract: Ten shots were fired in drill holes in Mizuho Plateau, East Antarctica for explosion seismic experiments in 1979–1981. The yield charge sizes are in a range of 10 to 1400 kg. An empirical relationship between the yield charge and the maximum amplitude of generated seismic waves was derived for the shots in drill holes in the snow field, which will aid to design an adequate charge size for future explosion seismic experiments in Antarctica. The maximum amplitudes obtained above were compared with those generated in sea water in Lützow-Holm Bay, Antarctica and those generated in the rock in the Izu Peninsula, Japan. When the explosives are less than 500 kg, the amplitudes are about 1/10 of the amplitudes generated in the sea, and about 1/5 of amplitudes generated in the rock. When the charge is large, the difference in amplitude between the shot in the sea and that in the rock is small. The amplitude of the largest shot of 1400 kg is nearly the same as that in the rock. This is because small shots were fired in shallow drill holes of 5 to 30 m deep where the ice density is about 0.5 g/cm³ and ice is very porous, whereas the largest shot was fired at a depth of 140 m where the density is greater than 0.7 g/cm³. The maximum amplitude of the seismic wave by a 1000-kg explosion at sea is about five times as large as that in the drill hole, which is similar to the relation for shots in the sea and in the rock obtained in Japan.

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